



Guidelines for In-House Composting Poultry Mortality as a Rapid Response to Avian Influenza

Version August 13, 2015

Gary A. Flory¹, Virginia Department of Environmental Quality, gary.flory@deq.virginia.gov

Robert W. Peer², Virginia Department of Environmental Quality, robert.peer@deq.virginia.gov

George W. Malone³, Malone Poultry Consulting, malonepoultryconsulting@gmail.com

Eric S. Bendfeldt⁴, Virginia Tech, ebendfel@vt.edu

Robert A. Clark⁵, Virginia Tech, raclark@vt.edu

- Summary of Method
- Advantages of In-House Composting
- Key Elements for Successful Composting
- Labor, Equipment and Supplies
- Protocols
 - Prior to Windrow Construction
 - Windrow Base Construction
 - Constructing the Core
 - Capping the Windrow
- Temperature Monitoring
- Temperature Log
- Troubleshooting
- List of References
- Contact Information

SUMMARY OF THE METHOD

Composting is a biological heating process that results in the natural degradation of organic resources (such as poultry carcasses) by microorganisms. Composting has been successfully used throughout the United States for nearly 2 decades to control outbreaks avian influenza. Composting can be effective with most bird types and poultry house designs.

Microbial activity within a well-constructed compost pile can generate and maintain temperatures sufficient to inactivate the avian influenza virus. The effectiveness of this virus inactivation process can be assessed by evaluating compost temperatures, the shape of the time and temperature curve, visual observation of carcass decomposition and the homogeneity of the compost mix.

ADVANTAGES OF IN-HOUSE COMPOSTING

- Contains the disease and limits off-farm disease transmission
- Limits the risks of groundwater and air pollution
- Inactivates pathogens in carcasses and litter
- Limits public concerns over disease exposure
- Composting equipment and supplies are readily available
- Minimizes delays, environmental impacts and process disruptions due to severe weather (precipitation, temperature fluctuation, etc.)

KEY ELEMENTS FOR SUCCESSFUL COMPOSTING

- Windrows (6 to 8 feet high and 12 to 15 feet wide) are constructed on an adequate and uniform base layer (10 to 15 inches thick) of sufficiently porous carbon material;
- The base layer and windrow are not compacted with equipment;
- Ensure good carcass to carbon contact, by creating a core with a minimum 1:1 mix by volume of carcasses, carbon and other infected material (manure, egg shells, feed, etc.) THERE IS NO NEED TO GRIND/CRUSH/MASCERATE THE CARCASSES DURING CONSTRUCTION!
- Windrows should be constructed to ensure adequate distribution of moisture throughout; and
- The windrows are capped with carbon material (8 to 12 inches thick) to ensure that no carcasses are exposed and to minimize odor.

“Research indicates that Avian Influenza Virus (AIV) can be inactivated in 10 minutes at 140°F (60°C) or 90 minutes at 133°F (56°C) (Lu et al., 2003).”

***In 2007,
composting was
used to dispose of
more than
2,000,000 pounds
of carcasses on 2
turkey farms
exposed to LPAI
in Virginia and
West Virginia.***



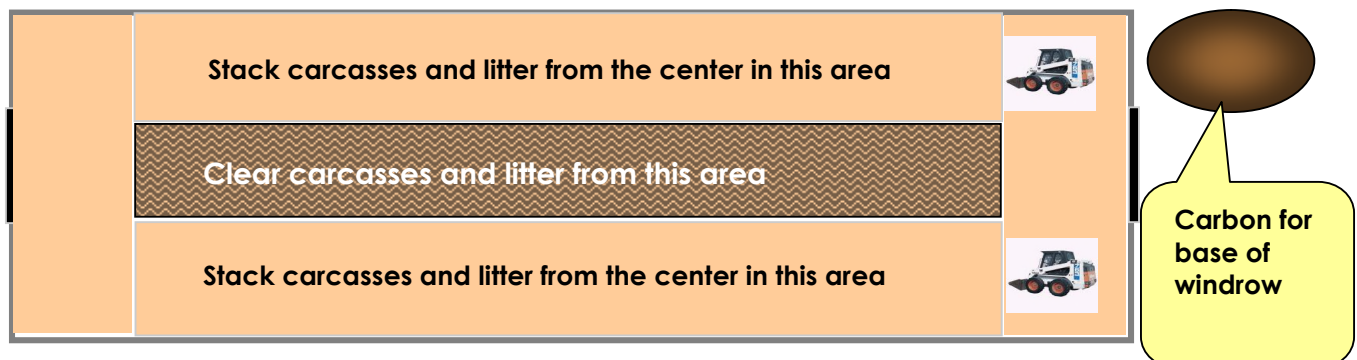
LABOR, EQUIPMENT AND SUPPLIES

- Skilled equipment operators and general laborers
- Skid loader(s), pay loaders, dump trucks, rakes and scoops
- Sawdust, litter, wood shavings, active compost, seed & nut hulls, woodchips, or other carbon material
- Compost thermometers (36" or 48" stem length)

PROTOCOLS

Prior to Windrow Construction

- Ensure that all personnel have appropriate personal protective equipment and training.
- Minimize ventilation; raise poultry feeders, and waterers.
- Effective in-house composting must have a minimum of 1.5 pounds of carbon material (based on a 30 lbs./cubic foot material) per pound of bird. (1 lb. of carbon per lb. of bird in the mix and the remaining carbon for base and cover.)
- Determine total pounds (lbs.) of birds
 - lbs. birds = number of birds X average weight in lbs.
- Determine total lbs. carbon needed
 - Total carbon = lbs. birds (from above) X 1.5
- Determine pounds of litter in house
 - cubic feet of litter = length of house X width of house X depth of litter (in feet)
 - lbs. litter = cubic feet of litter X weight of a cubic foot of litter (Average = 30 lbs; Range = 25 to 35 lbs.)
- Determine amount of additional carbon needed
 - Cubic yards of additional carbon needed = ((total lbs. carbon needed – lbs. litter in house)/(weight per cubic ft. of carbon material))/(27)
 - woodchips, litter or wet sawdust = 30 lbs./cubic ft.
 - dry sawdust = 15 lbs./cubic ft.
- Mobilize depopulation, composting, and sanitation crews.



Typical Free-Span House—Preparation for Windrow Construction



Windrow Base Construction:

- Before in-house composting, clear carcasses and litter from the windrow location(s) of the poultry house to create a 12-15 foot wide work area for construction of the windrow base(s). Distribute the material from on either side of the pathway.
- Using the largest loader possible, begin building the windrow base.
- The windrow base should be constructed 12-15 feet wide to a depth of 10 to 15 inches.
 - Carbon material for the base should be porous and bulky enough to allow adequate air flow into and through the windrow. Ideal materials for the base include bark mulch or coarse wood chips. Other acceptable materials include: straw, wood shavings, active compost, small grain hulls, and corn stover. Also coarse woody material in excess of 2 inches in size should be avoided to ensure that the resulting compost can be land applied as a soil amendment.
 - If these materials are not available, poultry litter may be used for the windrow base if it is sufficiently dry, porous and bulky.
 - To maintain the base's porosity and to avoid compaction, do not drive equipment on the base.

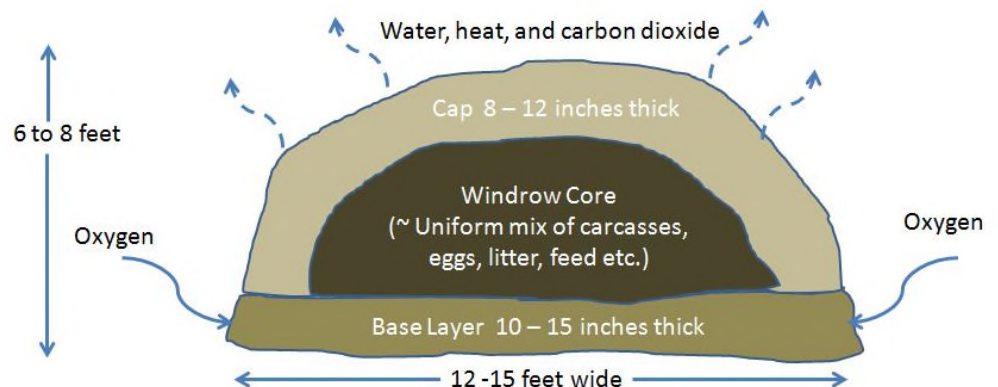
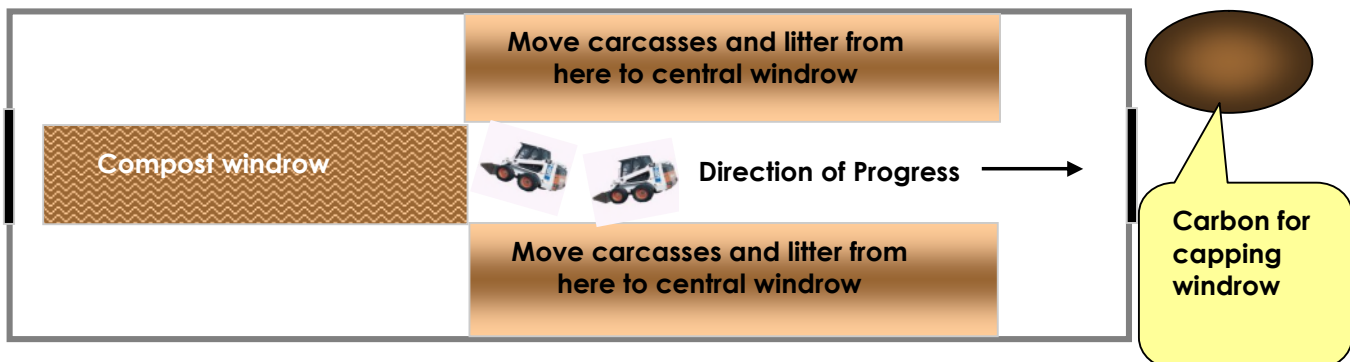


Figure 1. Cross Section of Compost Windrow



Typical Free-Span House—Windrow Construction



“Composting is the natural degradation of organic resources (such as poultry carcasses) by microorganisms.”

Construction of the Core

- The windrow core should consist of a uniform mix of carcasses and litter. The easiest way to get a uniform mix throughout the windrow is to scoop litter and birds together in each bucket load and add it to the windrow in a manner that thoroughly mixes the contents of the bucket. If additional carbon material is needed, the material should support heat generation (i.e. composting). Suitable materials include fresh wood shavings, active compost, poultry litter, straw, corn stover, and small grain hulls. In many instances this material may need to be blended with the existing litter and carcasses to be suitable.
- Any remaining feed should be blended and mixed with the carcasses and litter before windrow construction. Be sure to move infected material as little as possible.
- The mix of carcasses and litter should be added from both sides of the windrow. This allows the operators to reach the center of the windrow and avoid compacting the base with the tires or tracks of the loader.
- The windrow core should be constructed such that 1 foot of base material is exposed on both sides of the windrow.
- The core should be dome-shaped and of sufficient height to include the litter and carcass mix from the area adjacent to the windrow. At this stage the windrow height should not exceed 6 feet.
- Continue building the core until all of the litter and carcasses have been placed on the base.

Capping the Windrow

- Prior to capping the windrow, remove any carcasses that are near the edge of the windrow base and include them in the core of the windrow.
- Cap the windrow with 8 to 12 inches of a suitable carbon material. Carbon material for the cap should prevent flies from contacting carcasses, serve as an insulating blanket, and allow air to flow out of the piles. This material may be finer in texture than the base. Suitable material includes poultry litter, small grain hulls, sawdust, new bedding, wood chips.
- Ensure that the entire core is uniformly covered with cap material with no carcasses exposed.
- Avoid compacting windrow. Do not operate the loader's tires or tracks onto the sides of the windrow while capping.

TEMPERATURE MONITORING

- Temperatures at 18" and 36" depths in the compost piles should be regularly monitored at 50 foot intervals the length of the windrow and charted. See sample log on page 5.
- Windrows should reach temperatures of between 120° F and 150° F.

COMPOSTING TEMPERATURE LOG

[illegible]

TROUBLESHOOTING

The table below describes some of the most common composting problems and possible solutions.

| Problem | Issue | Solution |
|----------------------------------|-----------------------------------|--|
| Excessive flies or odor | Exposed carcasses | Add additional cap material |
| Leachate from windrow | Mixture too wet | Add additional carbon material, mix and cap |
| Temperature does not reach 131°F | Mixture too dry (< 40% moisture) | Add water to pile, mix if necessary |
| Temperature does not reach 131°F | Mixture too wet (> 60 % moisture) | Add additional carbon material, mix if necessary |
| Temperature drops early | Not enough oxygen | Aerate or mix pile |

LIST OF REFERENCES

Lu H., Castro A.E., Pennick K., Liu J., Yang Q., Dunn P., Weinstock D., and D. Henzler. 2003. Survival of Avian Influenza virus H7N2 in SPF Chickens and Their Environments. *Avian Diseases* 47:1015-1021

ADDITIONAL CONTACT INFORMATION

¹ Agricultural and Stormwater Program Manager, Virginia Department of Environmental Quality, Valley Regional Office, P.O. Box 3000, Harrisonburg, Virginia 22801 Phone: (540) 574-7840 Email: gary.flory@deq.virginia.gov

² Agricultural Program Coordinator, Virginia Department of Environmental Quality, Valley Regional Office, P.O. Box 3000, Harrisonburg, Virginia 22801 Phone: (540) 574-7866 Email: robert.peer@deq.virginia.gov

³ Malone Poultry Consulting, 13713 Allen Road, Princess Anne, Maryland 21853 Phone (443) 944-6910 Email: malonepoultryconsulting@gmail.com

⁴ Extension Specialist, Community Viability, Department of Crop and Soil Environmental Sciences, Virginia Tech/Virginia Cooperative Extension, 2322 Blue Stone Hills Dr., Ste. 140, Harrisonburg, VA 22801 Phone: (540) 432-6029 Ext. 106. Email: ebendfel@vt.edu

⁵ Extension Agent, Agriculture and Natural Resources, Virginia Tech/Virginia Cooperative Extension, 600 North Main St., Ste. 100, Woodstock, VA 22664 Phone: (540) 459-6140 Email: raclark@vt.edu